

IN THE CLAIMS:

Claims 1-11, 13-24, 26-27, and 29-46 have been amended herein. Please note that all claims currently pending and under consideration in the referenced application are shown below. Please enter these claims as amended. This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (currently amended) A method for performing coupled finite analyses to resolve a joint problem ~~using first and second between~~ finite analysis programs, the method comprising: ~~the first finite analysis program acting upon first program input values to provide first program output values based upon the first program input values, and~~
~~the second finite analysis program acting upon second program input values to provide second program output values, the second program input values including a first joint data set having at least a subset of the first program output values, the second program output values including a second joint data set of values that can be used as first program input values,~~
~~one of the first and second finite analysis programs being a computational fluid dynamics program, and~~
~~the method comprising the steps of:~~
providing first and second finite analysis programs, wherein one of the first and the second finite analysis programs is a computational fluid dynamics program;
identifying the joint problem through use of a graphical user interface operable to identify the joint problem, and to specify at least one criterion for a joint solution, wherein both the first and the second finite analysis programs can jointly and in combination solve the joint problem, ~~and to specify using the~~ at least one criterion for the joint solution;
(B)—providing ~~the~~ first program input values to the first finite analysis program;
(C)—executing the first finite analysis program to obtain ~~the~~ first program output values including ~~the~~ a first joint data set;
(D)—providing the second finite analysis program with second program input values including the first joint data set;
(E)—executing the second finite analysis program to provide second program output values

including ~~the~~ a second joint data set; and

(F)—providing the first finite analysis program with the first program input values including the second joint data set.

2. (currently amended) The method according to claim 1, wherein the at least one criterion for the joint solution specified by the graphical user interface includes an iterative convergence criterion for a threshold convergence of the joint solution and the method further comprises ~~the step of~~

——~~repeating steps~~ the acts of providing first program input values, executing the first finite analysis program, providing the second finite analysis program, executing the second finite analysis program, and providing the first finite analysis program, C, D, E, and F until the threshold convergence is achieved.

3. (currently amended) The method according to claim 2, wherein ~~the iterating step~~ repeating the acts is performed automatically and without user intervention ~~after a first time of performing steps (A) through (F).~~

~~Program Selections~~

4. (currently amended) The method according to claim 1, ~~wherein:~~
~~the step of identifying the joint problem includes selecting the joint problem as one in which one of the first and second first finite analytical programs is the computational fluid dynamics program and the other of the first and second finite analytical program addresses a problem selected from wherein the act of providing the first and the second finite analysis~~ program further comprises selecting another of the first and the second finite analysis programs from the group consisting of a structural analysis problems, program, a heat transfer problems, program, a chemical reaction problems, program, a chemical equilibrium problems, analysis program, an internal ballistics problems, and program, and a fracture mechanics problems program.

5. (currently amended) The method according to claim 1, further comprising:
~~including a third finite analysis program acting upon third program input values selected from the group consisting of the first program output values, the second program output values, and combinations thereof to provide third program output values;~~
~~the third program output values include a third joint data set comprising input values selected from the group consisting of first program input values, second program input values and combinations thereof; and~~
providing third program input values to a third finite analysis program, wherein the third program input values include data selected from the group consisting of the first joint data set, the second joint data set, and combinations thereof; and
~~the method includes a step of executing the third finite analysis program to produce~~ provide the
~~third program output values including the a third joint data set.~~

6. (currently amended) The method as set forth in claim 5, further comprising
~~including a step of providing the third joint data set as input values to the first finite analysis program, the second finite analysis program, or combinations thereof. and second finite analysis programs, the third joint data set comprising input values selected from the group consisting of the first program input values, the second program input values and combinations thereof.~~

7. (currently amended) The method according to claim 6, wherein the at least one
criterion for the joint solution specified by the graphical user interface includes an iterative convergence criterion for a threshold convergence of the joint problem and the method comprises the step of

~~iterating with repetition of steps C, D, E, F, C and H until threshold convergence is achieved~~ further comprises repeating the acts of providing first program input values, executing the first finite analysis program, providing the second finite analysis program, executing the second finite analysis program, providing the first finite analysis program, providing third program input values, executing the third finite analysis program, and providing the third joint data set, until threshold convergence is achieved.

~~Manner of execution~~

8. (currently amended) The method according to claim 1, wherein ~~the providing step~~ is s-providing the second finite analysis program with second program input values is performed automatically and without user intervention ~~following the executing step (C).~~

9. (currently amended) The method according to claim 1, wherein ~~the providing step~~ providing the first finite analysis program with first program input values is performed automatically and without user intervention ~~following the executing step (E).~~

~~GUI Insertion of New Programs~~

10. (currently amended) The method according to claim 1, wherein the graphical user interface includes an interface for selecting the joint problem as including an additional program and for creating a user-specified data link operable to provide the additional program with shared input values selected from the group consisting of the first program output values, the second program output values, and combinations thereof, and the method further comprises selecting the joint problem including the additional ~~is~~-program through use of the interface.

11. (currently amended) The method according to claim 10, wherein the additional program acts upon the shared input values and creates shared output values selected from the group consisting of the first program input values, the second program input values, and combinations thereof, and the method includes providing the shared output values to the first and the second finite analysis programs as specified by the user.

12. (original) The method as set forth in claim 1, wherein the computational fluid dynamics program comprises a crack-combustion program.

13. (currently amended) The method as set forth in claim 12, wherein the method further comprises ~~s~~ a means for modeling crack combustion in a missile based upon a computed

tomography taken from a missile.

14. (currently amended) The method as set forth in 13, wherein ~~the other~~ another of the first and the second finite analysis programs comprises a structural mechanics program.

Scripting Language

15. (currently amended) The method according to claim 1, wherein the ~~step~~ act of identifying the joint problem includes using the graphical user interface to select from a list of preprogrammed functions.

16. (currently amended) A system for obtaining a solution ~~in the form of a threshold convergence for to~~ a joint problem, the system comprising:

a storage medium configured for storing:

first and second finite analysis programs, wherein one of the first and the second finite

analysis programs is a computational fluid dynamics program; and

a graphical user interface operable to identify the joint problem and to specify at least one

criterion for a joint solution, wherein both the first and the second finite analysis

programs can jointly and in combination solve the joint problem;

a processor operably coupled to the storage medium for executing:

~~the first and second finite analysis programs;~~ to obtain first program output values

including a first joint data set;

the second finite analysis program to obtain second program output values including a

second joint data set; and

the graphical user interface; and

an input device operably coupled to the processor and configured for providing first program input values and second program input values;

~~the first finite analysis program acting upon the first program input values to provide first program output values based upon the first program input values;~~

~~the second finite analysis program acting upon the second program input values including a first joint data set having at least a subset of the first program output values, the second~~

~~program output values including a second joint data set of values that can be used as first program input values;~~
~~one of the first and second finite analysis programs being a computational fluid dynamics program;~~
~~a graphical user interface operable to identify a joint problem that both the first and second finite analysis programs can jointly and in combination solve, and to specify at least one criterion for a joint solution;~~
~~the processor having a first operational state for executing the first finite analysis program to obtain the first program output values including the first joint data set;~~
~~wherein the storage medium is further configured for providing the second finite analysis program with the second program input values including the first joint data set; and~~
~~the processor having a second operational state for executing the second finite analysis program to provide second program output values including the second joint data set; and~~
~~wherein the storage medium is further configured for providing the first finite analysis program with the first program input values including the second joint data set.~~

17. (currently amended) The system as set forth in claim 16, wherein the at least one criterion for the joint solution specified by the graphical user interface includes an iterative convergence criterion for a threshold convergence of the joint solution and the system comprises program instructions for repeating calculations until the threshold convergence is achieved.

18. (currently amended) The system as set forth in claim 17, wherein the program instructions for repeating calculations operates automatically until the threshold convergence is achieved.

~~Program Selections~~

19. (currently amended) The system as set forth in claim 16, wherein the graphical user interface comprises a menuing system for selecting the joint problem as ~~one in which one of the first and second finite analytical programs is a~~ a problem combining the computational fluid dynamics program ~~and the other with another~~ of the first and the second finite analytical analysis

programs ~~addresses a problem~~ selected from the group consisting of a structural analysis problems, program, a heat transfer problems, program, a chemical reaction problems, program, a chemical equilibrium problems, analysis program, an internal ballistics problems, and program, and a fracture mechanics problems program.

20. (currently amended) The system as set forth in claim 16, wherein:
~~including a third finite analysis program acting upon third program input values selected from the~~
~~group consisting of the first program output values, the second program output values,~~
~~and combinations thereof, to provide third program output values,~~
~~the third program output values include a third joint data set comprising input values selected~~
~~from the group consisting of the first program input values, the second program input~~
~~values and combinations thereof, and~~
the processor is further configured for executing ~~the a third~~ finite analysis program to ~~produce~~
obtain the third program output values including the a third joint data set;
the input device is further configured for providing third program input values; and
the storage medium is further configured for storing the third finite analysis program and
providing the third finite analysis program with the third program input values including
input values selected from the group consisting of the first joint data set, the second joint
data set, and combinations thereof.

21. (currently amended) The system as set forth in claim 20, including a predetermined data linkage for providing the third joint data set ~~to the first and second finite analysis programs with corresponding as~~ input values ~~selected from the group consisting of to the first finite analysis program input values, the second finite analysis program input values and, or~~ combinations thereof.

22. (currently amended) The system as set forth in claim 21, wherein the criterion for the joint solution specified by the graphical user interface includes an iterative convergence criterion for a threshold convergence of the joint problem and the system comprises:
program instructions for repeating calculations iterating until the threshold convergence

is achieved.

23. (currently amended) The system as set forth in claim 16, wherein the graphical user interface includes an interface for selecting the joint problem as one including an additional program and for creating a user-specified data link operable to provide the ~~user-specified~~ additional program with shared input values selected from the group consisting of the first program output values, the second program output values, and combinations thereof.

24. (currently amended) The system as set forth in claim 23, wherein the additional program acts upon the shared input values and creates shared output values selected from the group consisting of the first program input values, the second program input values, and combinations thereof, and the system comprises a predetermined data linkage for providing the shared output values to the first and the second finite analysis programs as specified by the user.

~~Missile Maintenance Application~~

25. (original) The system as set forth in claim 16, wherein the computational fluid dynamics program comprises a crack combustion program.

26. (currently amended) The system as set forth in claim 25, wherein the system comprises means for modeling crack combustion through use of the crack combustion program in a missile based upon a computed tomography taken from the missile.

27. (currently amended) The system as set forth in claim 26, wherein ~~the other another~~ of the first and the second finite analysis programs is a structural mechanics program.

28. (original) The system as set forth in claim 16, wherein the system comprises program instructions for identifying the joint problem by use of the graphical user interface to select from a list of preprogrammed functions.

3029. (currently amended) The system as set forth in claim 28, comprising the preprogrammed functions being in an extensible object oriented scripting language possessing looping and decisional logic capabilities.

3130. (currently amended) A computer readable form for use in an operating environment ~~where there exists including~~ an input device for providing ~~first program input values and second program input values;~~ user input, a storage medium for storing ~~first and second finite analysis programs; instructions, and~~ a processor operably coupled to the storage medium, the computer readable form comprising the instructions for execution on the processor to perform a process comprising: ~~for executing the first and second finite analysis programs;~~
the first finite analysis program acting upon first program input values to provide first program output values based upon the first program input values;
the second finite analysis program acting upon second program input values including a first joint data set having at least a subset of the first program output values, the second program output values including a second joint data set of values that can be used as first program input values;
one of the first and second finite analysis programs being a computational fluid dynamics program;
the machine readable form comprising machine executable instructions operable to provide: executing a graphical user interface operable to accept the user input, identify a joint problem, and to specify at least one criterion for a joint solution, wherein that both the a first and a second finite analysis programs can jointly and in combination solve, and to specify at least one criterion for a joint solution the joint problem and one of the first and the second finite analysis programs is a computational fluid dynamics program;
~~providing the first program input values to the first program;~~
executing the first finite analysis program acting upon first program input values, which include at least some of the user input, to obtain the provide first program output values including the a first joint data set;
~~providing the second finite analysis program with second program input values including the first joint data set;~~

executing the second finite analysis program acting upon second program input values, which include at least some of the user input and the first joint data set, to provide second program output values including ~~the~~ a second joint data set; and providing the first finite analysis program with the first program input values including the second joint data set.

~~3231.~~ (currently amended) The computer readable form as set forth in claim ~~31~~ 30, wherein the at least one criterion for the joint solution specified by the graphical user interface includes an iterative convergence criterion for a threshold convergence of the joint solution, and the computer readable form comprises instructions for repeating calculations until the threshold convergence is achieved.

~~3332.~~ (currently amended) The computer readable form as set forth in claim ~~31~~ 30, wherein:
the graphical user interface comprises instructions for selecting the joint problem as one in which one of the first and the second finite analysis programs is the computational fluid dynamics programs and ~~the other~~ another of the first and the second finite analysis programs is selected from the group consisting of a structural analysis program, a heat transfer program, a chemical reaction program, a chemical equilibrium analysis program, an internal ballistics program, and a fracture mechanics program. ~~addresses a problem selected from the group consisting of structural dynamics problems, heat transfer problems, chemical reaction problems, chemical equilibrium problems, internal ballistics problems, and fractional mechanics problems.~~

~~3433.~~ (currently amended) The computer readable form as set forth in claim ~~31~~ 30, wherein ~~the operating environment includes a third finite analysis program acting upon third program input values selected from the group consisting of the first program output values, the second program output values, and combinations thereof to provide third program output values,~~
the third program output values include a third joint data set comprising input values selected from the group consisting of the first program input values, the second program input values and combinations thereof, and

~~the computer readable form includes instructions for executing the third program-s to produce the third program output values including the third joint data set. including instructions for executing a third finite analysis program acting upon third program input values, which include the first joint data set, the second joint data set, or combinations thereof, to provide third program output values including a third joint data set.~~

~~3534.~~ (currently amended) The computer readable form as set forth in claim-34 33, including instructions for providing the third joint data set as input values to the first finite analysis program, the second finite analysis program, or combination thereof. ~~to the first and second finite analysis programs with corresponding input values selected from the group consisting of the first program input values, the second program input values and combinations thereof.~~

~~3635.~~ (currently amended) The computer readable form as set forth in claim-35 34, wherein the at least one criterion for the joint solution specified by the graphical user interface includes an iterative convergence criterion for a threshold convergence of the joint problem and the computer readable form comprises: comprises instructions for iterating until the threshold convergence is achieved.

~~3736.~~ (currently amended) The computer readable form as set forth in claim-31 30, wherein the graphical user interface includes instructions for an interface for identifying the joint problem as one including an additional program and for creating a user-specified data link operable to provide the ~~user-specified~~ additional program with shared input values selected from the group consisting of the first program output values, the second program output values, and combinations thereof.

~~3837.~~ (currently amended) The computer readable form as set forth in claim-37 36, wherein:
~~the user-specified~~ the additional program ~~aets~~ includes instructions for acting upon the shared
input values and creates- creating shared output values selected from the group consisting

~~of the first program input values, the second program input values, and combinations thereof, and~~

the computer readable form comprises instructions for providing the shared output values to the first and finite analysis program, the second finite analysis programs, or combinations thereof, as specified by the user.

3938. (currently amended) The computer readable form as set forth in claim ~~31~~ 30, wherein the computational fluid dynamics program is a crack combustion program, and the computer readable form comprises instructions for modeling crack combustion in a missile based upon a computed tomography taken from the missile through use of the crack combustion program.

4039. (currently amended) The computer readable form as set forth in claim ~~31~~ 30, wherein the ~~program~~ instructions are operable for identifying the joint problem by use of the graphical user interface to select from a list of preprogrammed functions.

4140. (currently amended) The computer readable form as set forth in ~~40~~ 39, comprising the preprogrammed functions written in an extensible object oriented scripting language possessing looping and decisional logic capabilities.

4241. (currently amended) A computer readable form for use in an operating environment ~~where there exists including~~ an input device for providing ~~first program input values and second program input values;~~ user input, a storage medium for storing ~~first and second finite analysis programs;~~ instructions, and a processor operably coupled to the storage medium, the computer readable form comprising the instructions for execution on the processor to perform a process comprising:

~~for executing the first and second finite analysis programs; the first finite analysis program acting upon first program input values to provide s first program output values based upon the first program input values; the second finite analysis program acting upon second program input values including a first joint data set having at least a subset of the first program~~

~~output values, the second program output values including a second joint data set of values that can be used as first program input values, the machine readable form comprising machine executable instructions operable to provide:~~

~~executing a scripting language with a preprogrammed function library operable to identify a joint problem and to specify at least one criterion for a joint solution, wherein that both the a first and a second finite analysis programs can jointly and in combination solve, and to specify at least one criterion for a joint solution; the joint problem and one of the first and the second finite analysis programs is a computational fluid dynamics program;~~

~~providing the first program input values to the first program;~~

~~executing the first finite analysis program acting upon first program input values to obtain the provide first program output values including the a first joint data set;~~

~~providing the second finite analysis program with second program input values including the first joint data set;~~

~~executing the second finite analysis program acting upon second program input values, which include the first joint data set, to provide second program output values including the a second joint data set; and~~

~~providing the first finite analysis program with the first program input values including the second joint data set.~~

4342. (currently amended) The computer readable form as set forth in claim-42 41, wherein the at least one criterion for the joint solution specified by the scripting language includes an iterative convergence criterion for a threshold convergence of the joint solution, and the computer readable form comprises instructions for repeating calculations until the threshold convergence is achieved.

4443. (currently amended) The computer readable form as set forth in claim-42 41, ~~wherein:~~ wherein the function library comprises instructions for selecting the joint problem as one in which one of the first and the second finite analysis programs is the computational fluid dynamics programs ~~and the other~~ and another of the first and the second finite analysis programs is selected from the group consisting of a structural analysis program, a heat transfer program, a

chemical reaction program, a chemical equilibrium analysis program, an internal ballistics program, and a fracture mechanics program. ~~addresses a problem selected from the group consisting of structural dynamics problems, heat transfer problems, chemical reaction problems, chemical equilibrium problems, internal ballistics problems, and fractional mechanics problems.~~

4544. (currently amended) The computer readable form as set forth in claim ~~42~~ 41, wherein the operating environment includes a third finite analysis program acting upon third program input values selected from the group consisting of the first program output values, the second program output values, and combinations thereof to provide third program output values, ~~the third program output values include a third joint data set comprising input values selected from the group consisting of the first program input values, the second program input values and combinations thereof, and~~

~~the function library includes instructions for executing the third program to produce the third program output values including the third joint data set.~~ including instructions for executing a third finite analysis program acting upon third program input values, which include the first joint data set, the second joint data set, or combinations thereof, to provide third program output values including a third joint data set.

4645. (currently amended) The computer readable form as set forth in claim ~~45~~ 44, including instructions for providing the third joint data set as input values to the first finite analysis program, the second finite analysis program, or combination thereof. ~~to the first and second finite analysis programs with corresponding input values selected from the group consisting of the first program input values, the second program input values and combinations thereof.~~

4746. (currently amended) The computer readable form as set forth in claim ~~46~~ 45, wherein the at least one criterion for the joint solution specified by the scripting language includes an iterative convergence criterion for a threshold convergence of the joint problem and the computer readable form ~~comprises:~~ comprises instructions for iterating until the threshold convergence is achieved.